

REMARKS

The Examiner's comments together with the cited references have been carefully studied. Favorable reconsideration in view of the foregoing amendments and following remarks is respectfully requested.

New Claim 17 is focused on the nature of the support (13:3) and new claims 16 and 18 are focused on the nature of the solvent (5:22; 6:7; 13:21), respectively. New claims 19 and 20 are directed to narrowed versions of the inkjet printing method.

Claims 4, 5, and 11 stand rejected under 35 U.S.C. 112, second paragraph, for depending directly or indirectly on cancelled claims. Claims 4 and 11 have been amended to depend from Claim 1 rather than from cancelled claims, and that also overcomes the rejection of claim 5.

Claims 1, 2, 4-9, and 11-12 stand rejected under 35 U.S.C. 102(b) as being anticipated by or, alternatively, under 35 U.S.C. 103(a) as being unpatentable over Phan et al. (5,338,766). According to the Examiner:

Phan et al disclose methods for making foam and absorbent articles having open-cell structure. Water-soluble polymers containing hydrophilic groups are taught from column 7, line 46, to column 8, line 21. Blowing agents and high shear mixing are taught in columns 11-12. Exposure to microwave radiation to cause expansion and/or reaction in a foamed polymer solution is taught from column 17, line 29, to column 18, line 26. Microwave radiation for forming thin films is taught in column 17, lines 45-49. Applications where it is desirable to absorb and/or retain fluids are taught in column 35, lines 33-45. With respect to the recitation "8 minutes of less to form an open cell structure" in claim 1, "5 minutes of less" in claim 4 and "2 minutes or less" in claim 5, Phan et al do not specifically teach the time period required to form an open-celled structure. However, the instantly recited drying times would be expected to be determined by such factors as thickness of the solution, distance from the microwave source, microwave power level, etc. and well within the scope of the method disclosed by Phan et al. It is the examiner's position that the method disclosed by Phan et al would result in an open-cell structure within 8 minutes or less when using microwave radiation, in the absence of evidence to the contrary.

Phan does not disclose "coating the foamed hydrophilic polymer solution onto a support substrate to form a coated support substrate" as required by step b) of Claim 1. A substrate is mentioned by Phan at column 17, lines 60-63 where it is stated that "The dispersion may be applied to a temporary or permanent substrate

prior to its expansion and reaction to form the polymer foam," i.e. coating prior to foaming whereas the present method claim requires foaming prior to coating. Claim 1 is novel over Phan for at least that reason.

Claim 1 further requires, in step a): "generating a foamed hydrophilic polymer solution" which means the hydrophilic polymer is dissolved in the solvent. In Phan, when the polymer is formed by reaction of monomers (or monomer and crosslinker) a "substantially solvent-insoluble polymer" is formed (see column 13, lines 33-35, and also column 17, lines 64-66). This is a second point of novelty. Phan is focused on a polymer of requisite insolubility in the solvent whereas the present Claim 1 requires a hydrophilic polymer *solution*. Further, Phan doesn't disclose coating a foamed polymer (never mind foamed polymer solution) onto a support or substrate (it discloses foaming after coating), whereas that is a required feature of present Claim 1.

As to the distinction between the product and method of Phan (with and without microwave) and the claimed method, it should be noted that microwaves are only mentioned in Phan as one of several ways of expanding a blowing agent to generate a foam. It's not used to treat a foamed hydrophilic polymer solution (e.g. for drying) as in the present invention. It certainly appears that the method of Phan is much more complex than the claimed method.

Phan never has a foamed polymer solution. It is a clear teaching from Phan to avoid blowing a polymer solution and to carry out polymerization after blowing. At column 3, lines 22-31 and column 4, lines 26-28, "expansion" and "reaction to form a polymer" are mentioned as separate steps. At column 5, from line 36, reaction to form an *insoluble* polymer is mentioned as occurring "during or after expansion," but it is taught at column 13, line 60 that the conditions should preferably be controlled such that reaction to form an *insoluble* polymer occurs after expansion. The option to expand a polymer *solution* does not even exist with the *insoluble* polymer of Phan.

Applicants therefore respectfully request that the Examiner reconsider and withdraw this rejection of the claims under 35 U.S.C. 102(b), or, alternatively, under 35 U.S.C. 103(a).

Claims 1, 2, 4-9, and 11-12 stand rejected under 35 U.S.C. 102(b) as being anticipated by or, alternatively, under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (6,261,679). According to the Examiner:

Chen et al disclose methods for making fibrous absorbent materials including an embodiment wherein the fibrous structure is filled with hydrophilic open-celled foams. Hydrophilic polymers, including gelatin, are taught in column 11, line 47 to column 12, line 65. Foaming a polymeric foam-able binder material and carrier fluid by mechanical or chemical means followed by removal of the fluid carrier by means such as microwave drying is taught (column 19, line 64, to column 20, line 22). High shear mixing is taught in column 21, lines 18-65. Blowing agents for hydrophilic foam systems comprising acid are taught in column 24, lines 1-14. Chen et al also teach exposure to microwave radiation as post treatment to crosslink polymers in solution (column 23, lines 46-51, and column 29, lines 29-64, at line 57). The method disclosed by Chen et al comprises binding fibers with the polymeric foamable binder material; however, this embodiment is encompassed by the comprising language of the instant claims. With respect to the recitation "8 minutes of less to form an open cell structure" in claim 1, "5 minutes of less" in claim 4 and "2 minutes or less" in claim 5, Chen et al do not specifically teach the time period required to form an open-celled structure. However, Example 6 teaches heat treatment for 5 minutes to cure or activate the binders. The instantly recited drying times would be expected to be determined by such factors as thickness of the solution, distance from the microwave source, microwave power level, etc. and well within the scope of the method disclosed by Chen et al. It is the examiner's position that the method disclosed by Chen et al would result in an open-cell structure within 8 minutes or less when using microwave radiation, in the absence of evidence to the contrary.

Chen does not disclose "coating a foamed hydrophilic polymer solution onto a support substrate to form a coated support substrate." For at least that reason, Claim 1 is novel over Chen. Chen is concerned with a method of producing an open cell absorbent fibrous structure in which the arrangement of fibers forms the three-dimensional structure of the material and which are held together by a water-insoluble binder. The method of formation of the fibrous structure generally involves forming a dispersion of fibers in a solution of binder in a carrier liquid, optional foaming of the mixture, and removal of the carrier liquid to generate an open cell structure, in which the internal cavities are defined by fibers held together with binder. The purpose of the open cell absorbent fibrous material is as an absorbent material of which possible uses are mentioned at column 2, lines 43 to 49 and include absorbent articles for intake, distribution and retention of human body fluids, and potentially

also as filter components such as face masks, as well as for shock absorbing pads and industrial spill absorbents.

Chen describes his structure as a foam-reinforced fibrous network (see column 2, line 64). Many embodiments of this material and general method are described. Some embodiments involve mixing the fibers with a solution of foamable polymer in a liquid carrier, foaming the mixture (e.g. through shear stirring or with blowing agents) which has the effect of arranging the fibers about the surface of the bubbles and then removing the liquid carrier to form a three-dimensional fibrous open-celled structure in which the fibers of the structure are bound together with the polymer binder. The preferred embodiments of the invention in Chen are (according to column 6, lines 58 to 62) where the structures are foam-reinforced fibrous structures where foam technology serves to provide structure and optional resiliency to a largely fibrous structure. The purpose of foaming (see column 9, lines 57 to 58) is to structure or rearrange the fibers in a three dimensional porous structure orientation. The structuring composition, typically a foamable polymer, may form a binder material for the fibrous structure (see column 10, lines 28 to 32). Multiple methods of curing the binder material onto the fibrous structure (i.e. forming bonds which stabilize the fibers) are mentioned, including microwave radiation

In one embodiment (at column 20, lines 17 to 22), microwave drying is mentioned as one of a number of ways of removing carrier liquid from a foamed mixture of fibers, foamable polymeric binder, and a carrier liquid.

A specific embodiment of Chen is one in which within the pores formed in the absorbent fibrous structure are formed spherical shells of polymeric foamable material defining pores of a smaller diameter than that of the fibrous structure (see column 41, lines 55 to 65, with reference to Figure 4).

The present invention for a method of making a material requires the steps of generating a foamed hydrophilic polymer *solution*, coating the foamed hydrophilic polymer solution onto a support substrate to form a coated support substrate, and treating the foamed hydrophilic polymer solution by exposing it to a source of microwave radiation for 8 minutes or less to form an open-cell structure.

The disclosures in Chen concern forming an absorbent fibrous structure whereby the fibers form the structure of the material and define the pores.

The use of foamable polymers and the foam technology is intended primarily to arrange the fibers in a three-dimensional porous structure and optionally to use the foamable polymer as a binder for fibers. There is a single disclosure (at column 41) of forming a polymer foam within the pores of the fibrous structure. However, there is no disclosure in Chen of coating a foamed hydrophilic polymer solution onto a support substrate to form a coated support substrate. There is not a suggestion or inkling that one skilled in the art in possession of Chen et al. would be inclined to coat the foamed polymer solution onto a support substrate.

New Claims 16-18 provide limits related to the nature of the support and the solvent for the solution. Chen appears to be directed to a water-barrier support. Claims 19 and 20 contain “consisting essentially of” language applied to the material being formed and the foamed hydrophilic polymer solution respectively. Having a lot of requisite fibrous material providing the structural integrity of the product readily distinguishes the product and methods.

Applicants therefore respectfully request that the Examiner reconsider and withdraw this rejection of the claims under 35 U.S.C. 102(b), or, alternatively, under 35 U.S.C. 103(a).

Claims 1, 2, 6-9, and 11-14 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Aono (5,128,313) in view of Chen et al. (6,261,679) or Phan et al. (5,338,766). According to the Examiner:

Aono discloses preparation of an image receiving material comprising a porous dye diffusion-preventing layer, preferably gelatin. The method steps for obtaining the porous layer, including the features of instant claims 2 and 6-8, are taught in column 9, lines 3-31. Aono teaches that the solution is coated on a support and dried to form a microporous layer (column 9, lines 32-54). See Example 1, solutions I and II, column 14, lines 35-54, for preparation of a dye accepting polymer emulsion. A thermal transfer image receiving layer including the porous layer is taught in column 9, lines 55-68.

...Chen et al teach using microwave energy to remove carrier fluid after foaming the foamable polymeric material and also teach exposure to microwave radiation as post treatment to crosslink polymers in solution in an analogous method for producing open-celled foam structures.

The disclosure of Phan et al is discussed herein above. Exposure to microwave radiation to cause expansion and/or reaction in a foamed polymer solution and/or microwave radiation for forming thin films are taught as method steps for obtaining an open-cell structure.

It would have been obvious to one skilled in the art at the time of the invention to employ microwave radiation, as taught by Chen et al or Phan et al in an analogous method for producing open-celled structures, in the method taught by Aono. Aono teaches drying a polymer solution on a support to form a microporous layer. Chen et al teach that microwave radiation is useful for drying and/or crosslinking an analogous foamable material. Phan et al teach that exposure to microwave radiation is useful for making foam and absorbent articles having open-cell structure wherein thin films are treated. One skilled in the art at the time of the invention would have been motivated by a reasonable expectation of providing an open-celled foam structure using microwave radiation as the source of thermal energy, as taught by Chen et al or Phan et al, in the method disclosed by Aono. With respect to claims 1, 4 and 5, It would have been obvious to one skilled in the art at the time of the invention to determine the necessary or optimum time of exposure to microwave radiation required to obtain the desired foam without undue experimentation. One skilled in the art at the time of the invention would have been expected to determine the conditions of exposure required to obtain the desired foam product within a desired time period, in the absence of evidence to the contrary. With respect to the recitation "8 minutes of less to form an open cell structure" in claim 1, "5 minutes of less" in claim 4 and "2 minutes or less" in claim 5, Chen et al nor Phan et al specifically teaches the time period required to form an open-celled structure. However, the instantly recited drying times would be expected to be determined by such factors as thickness of the solution, distance from the microwave source, microwave power level, etc. and well within the ordinary level of skill of the one employing microwave radiation in the method disclosed by Aono. With respect to claims 13 and 14, the material on a support taught by Aono would be expected to be suitable for an ink receiving layer since the components and methods correspond to those instantly disclosed for obtaining an ink receiving layer.

Aono relates to an improved thermal transfer image receiving material for thermal transfer imaging systems. Thermal transfer imaging systems comprise a thermal transfer dye providing material and a corresponding dye receiving material. A thermolabile dye is sublimed or diffused to the receiving material according to a desired image on application of heat. Problems arise in connection with retransfer of the dye and diffusion of the dye beyond the dye receiving layer of the image receiving material as well as with heat retention. The invention described in Aono is concerned with improving the stability of the dye image over time and reducing the risk of retransfer of dye to other materials (color migration by contact). According to the invention of Aono, at least the outermost layer of the thermal transfer image receiving

material comprises a dye accepting polymer or blend of polymers having a high glass transition temperature dispersed through a water soluble binder.

At column 8, lines 62 to 65, of Aono, it is stated that the thermal transfer image receiving layer may have an interlayer containing no water soluble binder between the support and the image receiving layer, which interlayer optionally serves as a cushioning layer, a porous layer and/or a dye diffusion-preventing layer for preventing the thermolabile dye from diffusing in the support. The function of a porous layer is to prevent heat applied during the imaging process from diffusing from the image receiving layer thereby enabling effective use of the heat. A porous layer may be formed using organic solvent soluble binders (see column 9, lines 32 to 54) or water soluble-binders (see column 9, lines 15 to 31). There is no suggestion of an open-cell system nor of any benefit to such a system.

There is no disclosure in Aono of treating the coated foamed hydrophilic polymer solution with a source of microwave radiation, nor any disclosure of an open-cell structure which is critical to the present invention. Nor is there any indication or suggestion in Aono to lead the skilled person to use a source of microwave radiation to treat the coated hydrophilic polymer solution.

One of ordinary skill in the art would not think to combine the teaching of Aono, in so far as it relates to forming a porous layer for a receiver with that of a thermal dye-transfer image, with either Chen, which relates to a method of producing an open-cell absorbent fibrous structure for use in diapers and sanitary articles, or Phan, which relates to super absorbent polymer foam materials for diapers and sanitary articles. The field of technology for Aono is entirely different from that of Chen and Phan and the technology applied in the latter two cases are different from one another. While Aono has as a primary purpose to employ a porous layer as a thermal insulator, the other two references are focused on the ability to absorb bodily fluids. Aono can be perfectly happy with a closed pore system to prevent heat transfer, but such would never facilitate the absorption of a liquid.

The skilled person in the art in possession of Aono would not be motivated to seek to improve the porous layer. Even if the skilled person were motivated to seek an improvement in the interlayer of Aono, he would not be motivated to refer to the diaper and sanitary article fields of technology, which is an

entirely different field of technology. Even if the skilled person were to refer to those fields of technology, he would not be motivated to refer to Chen or Phan. Chen and Phan describe very different technologies that can be used as absorbent materials for diapers, which are characterized by requiring high liquid capacity and rapid uptake with effective retention of liquid (but not with rapid drying and anti-smearing as in inkjet). The interlayer of Aono, when selected as a porous layer, is not for the purpose of absorbing liquid, but for insulating to prevent heat loss from the contact region during image transfer. The skilled person in the art would not have a reasonable expectation of any problem in the thermal insulative properties of an interlayer of a thermal image transfer element of being addressed in a high capacity body extrudant absorbent element for use in diapers and sanitary items.

Furthermore, even if the skilled person were to refer to Chen or Phan, there are multiple treatments performed in the making of and on the structures described in Chen and Phan and there is nothing in particular in either of those documents that would lead the skilled person to adopt that treatment in a non-liquid absorbing interlayer of a thermal transfer image receiving element.

Applicants have reviewed the prior art made of record and believe that singly or in any suitable combination, they do not render Applicants' claimed invention unpatentable.

In view of the foregoing remarks and amendment, the claims are now deemed allowable and such favorable action is courteously solicited.

Respectfully submitted,



Arthur E. Kluegel
Attorney for Applicant(s)
Registration No. 25,518

AEK:clb
Rochester, NY 14650
Telephone: (585) 477-2625
Facsimile: (585) 477-1148

If the Examiner is unable to reach the Applicant(s) Attorney at the telephone number provided, the Examiner is requested to communicate with Eastman Kodak Company Patent Operations at (585) 477-4656.

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